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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 210109/EP/pr	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP2003/014987	International filing date (day/month/year) 30.12.2003	Priority date (day/month/year) 30.12.2003
International Patent Classification (IPC) or both national classification and IPC H04J11/00		
Applicant TELEFONAKTIEBOLAGET L M ERICSSON (PUBL)		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 8 sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application</p>

Date of submission of the demand 22.06.2005	Date of completion of this report 18.01.2006
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International application No. PCT/EP2003/014987

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

2-15 as originally filed
1, 1a received on 22.12.2005 with letter of 21.12.2005

Claims, Numbers

1-24 received on 22.12.2005 with letter of 21.12.2005

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

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5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-24
	No: Claims	
Inventive step (IS)	Yes: Claims	1-24
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: US 2003/026235 A1 (GRILLI FRANCESCO ET AL) 6 February 2003 (2003-02-06)

V.1 NOVELTY AND INVENTIVE STEP

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A method for performing allocation of channelisation codes to channels in a Code Division Multiple Access (CDMA) system having the channelisation codes organised in a primary and zero or more secondary code trees, where each of the code trees has zero or more alternative code trees, each code tree having one or more channelisation codes per spreading factor, where the channelisation codes are according to their position in the code tree denoted consecutively by a code index with a lowest to a highest value per spreading factor within each code tree (par. 39-41; fig. 4), and where the system deploys any combination of channels which may operate in a first Compressed Mode (CPM) type requiring reallocation of channels to a channelisation code with a lower spreading factor, and channels according to a second CPM type, which do not require reallocation (par. 44-58; fig. 7a, 7b),

The subject-matter of claim 1 differs from this known method in that the channel according to the first Compressed Mode type is allocated a channelisation code with a lowest code index out of a group of free channelisation codes for a certain spreading factor, and a channel according to the second Compressed Mode type is allocated a channelisation code with a highest code index out of the group of free channelisation codes for a certain spreading factor.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to allocate channelization codes for different structures of the compressed mode

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configuration.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) since the two-way search structure, accommodating also punctured CPM is neither disclosed nor rendered obvious by any available prior art.

Claims 1-24 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

* * * * *

Title

METHOD AND SYSTEM FOR ALLOCATION OF CHANNELISATION CODES IN A CODE
DIVISION MULTIPLE ACCESS SYSTEM. EPO - DG 1

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22.12.2005

Field of the Invention

(87)

The present invention relates generally to radio communications systems, such as cellular communication systems, having mobile radios and a radio network infrastructure. More particularly, the present invention facilitates a method and system for performing allocation of channelisation codes to channels in a Code Division Multiple Access (CDMA) system having the channelisation codes organised in a primary and zero or more secondary code trees, where each of the code trees has zero or more alternative code trees, each code tree having one or more channelisation codes per spreading factor, where the channelisation codes are according to their position in the code tree denoted consecutively by a code index with a lowest to a highest value per spreading factor within each code tree, and where the system deploys any combination of channels which may operate in a first Compressed Mode (CPM) type requiring reallocation of channels to a channelisation code with a lower spreading factor, and channels according to a second CPM type, which do not require reallocation.

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Background of the invention

A method as described is for example disclosed in US patent application nr. US 2003/026235, directed to techniques to time-share a common channelization code among multiple terminals for compressed mode transmissions.

Down link (DL) transmissions in an implementation of a CDMA

1a

system, such as in a Wideband CDMA (WCDMA) system according the current 3rd Generation Partnership Project (3GPP) standard TS 25 series, in particular TS 25.213 (Spreading and modulation (FDD)), are coded using a scrambling code and a channelization code per channel, where each 5 connection between base station and user mobile station may comprise one or more physical channels. The purpose of the scrambling code is to have little interference between transmission in different cells, while the channelization code serves the purpose of limited interference between 10 transmissions in one cell. Each cell is allocated a primary scrambling code and one or more (typically 15 for a WCDMA system) secondary scrambling codes. The secondary scrambling codes are used to create additional code space.

All channelization codes using the same scrambling code are organised in a code tree where two codes on a certain level are spawned

WHAT IS CLAIMED IS:

(87)

1. A method for performing allocation of channelisation codes (C_{ch}) to channels in a Code Division Multiple Access (CDMA) system having the channelisation codes (C_{ch}) organised in a primary and zero or more secondary code trees (fig. 2, fig. 3), where each of the code trees (fig. 2, fig. 3) has zero or more alternative code trees (fig. 2, fig. 3), each code tree (fig. 2, fig. 3) having one or more channelisation codes (C_{ch}) per spreading factor (SF), where the channelisation codes (C_{ch}) are according to their position in the code tree (fig. 2, fig. 3) denoted consecutively by a code index with a lowest to a highest value per spreading factor (SF) within each code tree (fig. 2, fig. 3), and where the system deploys any combination of channels which may operate in a first Compressed Mode (CPM) type requiring reallocation of channels to a channelisation code with a lower spreading factor (SF), and channels according to a second CPM type, which do not require reallocation, characterised in that the channel according to the first Compressed Mode type is allocated a channelisation code with a lowest code index out of a group of free channelisation codes (C_{ch}) for a certain spreading factor (SF), and a channel according to the second Compressed Mode type is allocated a channelisation code with a highest code index out of the group of free channelisation codes (C_{ch}) for a certain spreading factor (SF).
2. The method according to claim 1 wherein a request for allocation of a channelisation code for a channel encloses the type of CPM to be deployed.
3. The method according to claim 1, wherein the group of free channelisation codes (C_{ch}) for a certain spreading factor (SF) comprises channelisation codes (C_{ch}) from the primary code tree (fig. 2, fig. 3).
4. The method according to claim 3, wherein the group of free channelisation codes (C_{ch}) for a certain spreading factor (SF) also

comprise channelisation codes (C_{ch}) from one or more secondary code trees (fig. 2, fig. 3).

5. The method according to claims 3 or 4, wherein the group of free channelisation codes (C_{ch}) for a certain spreading factor (SF) also comprise channelisation codes (C_{ch}) from one or more alternative code trees (fig. 2, fig. 3), each of the alternative code trees (fig. 2, fig. 3) being related to said primary or secondary code tree (fig. 2, fig. 3).

10. The method according to claim 5, wherein selection of a channelisation code from the group of free channelisation codes (C_{ch}) for a certain spreading factor (SF) from the primary code tree (fig. 2, fig. 3) has precedence over a channelisation code from each of the alternative code trees (fig. 2, fig. 3), where the alternative code tree (fig. 2, fig. 3) is related to the primary code tree (fig. 2, fig. 3).

15. The method according to claims 5 or 6, wherein selection of a channelisation code from the group of free channelisation codes (C_{ch}) for a certain spreading factor (SF) from the alternative code tree (fig. 2, fig. 3), where the alternative code tree (fig. 2, fig. 3) is related to the primary code tree (fig. 2, fig. 3), has precedence over a channelisation code from the secondary code tree (fig. 2, fig. 3).

20. The method according to claims 5, 6 or 7, wherein selection of a channelisation code from the group of free channelisation codes (C_{ch}) for a certain spreading factor (SF) from the secondary code tree (fig. 2, fig. 3), has precedence over a channelisation code from an alternative code tree (fig. 2, fig. 3). where the alternative code tree (fig. 2, fig. 3) is related to the secondary code tree (fig. 2, fig. 3).

25. The method according to claims 3 to 8, wherein the group of free channelisation codes (C_{ch}) do not include channelisation codes (C_{ch}) that are reserved.

30. The method according to claims 1 where the reallocation of a channelisation code is an occasion limited in time duration.

11. The method according to any of the preceding claims,

comprising the steps of:

- determining the type of CPM of the channel which is to be allocated a channelisation code;

5 - selecting a channelisation code from the group of free channelisation codes (C_{ch}) with a lowest code index, hence starting from the left side of the primary code tree (fig. 2, fig. 3) for allocating a channelisation code for a channel according to the first Compressed Mode type;

10 - selecting a channelisation code from the group of free channelisation codes (C_{ch}) with a highest code index, hence starting from the right side of the primary code tree (fig. 2, fig. 3) for allocating a channelisation code for a channel according to the second Compressed Mode type.

12. The method according to claims 1 to 10, for allocating a channelisation code to a channel according to a first CPM type comprising: 15 the steps of:

- creating a list of candidate channelisation codes (C_{ch}) in the primary code tree (fig. 2, fig. 3) which are free and not reserved;

20 - excluding from the list a candidate channelisation code, having a corresponding parent code at the associated alternative code tree (fig. 2, fig. 3) which is not free;

25 - selecting and allocating a candidate channelisation code from the list with a lowest code index, hence from the left side of the code tree (fig. 2, fig. 3), on the primary code tree (fig. 2, fig. 3), if more than one candidate channelisation code exists in the primary code tree (fig. 2, fig. 3);

30 - reallocating a channel according to the second Compressed Mode type from the primary code tree (fig. 2, fig. 3) to an alternative code tree (fig. 2, fig. 3) if there is no candidate channelisation code on the list, and allocating the freed channelisation code to the channel

according to the first CPM type;

- allocating a channelisation code from a new secondary code tree (fig. 2, fig. 3) if insufficient free space is created through reallocation of channels according to the second CPM type.

5 13. The method according to claims 1 to 10, for allocating a channelisation code to a channel according to the second CPM type comprising the steps of:

- creating a list of candidate channelisation codes (C_{ch}) in the primary (or secondary) code tree (fig. 2, fig. 3) which are free and not reserved;

10 - selecting and allocating a channelisation code from the list with a highest code index, hence from the right side of the code tree (fig. 2, fig. 3), on the primary (or secondary) code tree (fig. 2, fig. 3), if more than one candidate exists in the primary (or secondary) code tree (fig. 2, fig. 3);

15 - creating a first alternative list, if no candidate channelisation code at the primary (or secondary) code tree (fig. 2, fig. 3) exists, with candidate channelisation codes (C_{ch}) at a right side alternative code tree (fig. 2, fig. 3) related to the primary (or secondary) code tree (fig. 2, fig. 3), which channelisation codes (C_{ch}) must be free and not reserved and with the restriction that the same channelisation code at the related primary (or secondary) code tree (fig. 2, fig. 3) must be used by a channel according to the second CPM type;

20 - selecting and allocating the candidate channelisation code with the highest code index from said first alternative list if more than one candidate channelisation code exists;

25 - creating a second alternative list with candidate channelisation codes (C_{ch}) at a left alternative code tree (fig. 2, fig. 3), which alternative code is related to said primary code tree (fig. 2, fig. 3), if no candidate channelisation code at the right alternative code tree (fig. 2, fig. 3) exists, which channelisation codes (C_{ch}) must

be free and not reserved and the same channelisation code at the primary code tree (fig. 2, fig. 3) must be used by a channel according to the second CPM type;

- selecting and allocating the candidate channelisation code with the highest code index from said second alternative list if more than one candidate channelisation code exists;

- allocating a channelisation code from a new secondary code tree (fig. 2, fig. 3) if no candidate channelisation code at the left alternative code tree (fig. 2, fig. 3) exists.

10 14. The method according to claims 11, 12 or 13, where the steps are deployed on, and related to, the primary code tree (fig. 2, fig. 3) or the secondary code tree (fig. 2, fig. 3).

15 15. The method according to any of the preceding claims wherein the first CPM type is a Spreading factor (SF) divide by 2 (SF/2) method, and the second CPM type is a Higher level scheduling (HLS) or puncturing method.

16. The method according to any of the preceding claims wherein the CDMA system is a WCDMA system

20 17. A Code Division Multiple Access (CDMA) system comprising radio base stations (RBS), radio base station controllers (RBC), radio network controllers (RNC) and mobile user equipment wherein the system deploys the method of claims 1, 11, 12, 13, 14 or 15.

18. A system according to claim 17, wherein the system is a system operating according to a Wideband CDMA (WCDMA) standard.

25 19. A radio base station (RBS), operating in a Code Division Multiple Access (CDMA) system, comprising electronic equipment, processing units, I/O circuitry and memory, configured to select and allocate channelisation codes (C_{ch}), create and store lists with free and not reserved channelisation codes (C_{ch}), reallocate channels, determine the CPM type of the channel requesting for a channelisation code, and apply the signalling between the elements requesting for allocation of a

channelisation code to a channel and the elements performing the allocation of a channelisation code to a channel, according to the method of claims 1, 11, 12, 13, 14 or 15.

20. A device according to claim 19, wherein the device operates according to a Wideband CDMA (WCDMA) standard.

5 21. A radio base station controller (RBC), operating in a Code Division Multiple Access (CDMA) system, comprising electronic equipment, processing units, I/O circuitry and memory, configured to select and allocate channelisation codes (C_{ch}), create and store lists with free and 10 not reserved channelisation codes (C_{ch}), reallocate channels, determine the CPM type of the channel requesting for a channelisation code, and apply the signalling between the elements requesting for allocation of a 15 channelisation code to a channel and the elements performing the allocation of a channelisation code to a channel, according to the method of claims 1, 11, 12, 13, 14 or 15.

22. A device according to claim 21, wherein the device operates according to a Wideband CDMA (WCDMA) standard.

23. A radio network controller (RNC), operating in a Code Division Multiple Access (CDMA) system, comprising electronic equipment, 20 processing units, I/O circuitry and memory, configured to select and allocate channelisation codes (C_{ch}), create and store lists with free and not reserved channelisation codes (C_{ch}), reallocate channels, determine the CPM type of the channel requesting for a channelisation code, and apply the signalling between the elements requesting for allocation of a 25 channelisation code to a channel and the elements performing the allocation of a channelisation code to a channel, according to the method of claims 1, 11, 12, 13, 14 or 15.

24. A device according to claim 23, wherein the device operates according to a Wideband CDMA (WCDMA) standard.